DOCUMENT RESUME

ED 059 978 SP 005 590

AUTHOR	Ayllon, Teodoro
TITLE	Behavior Modification in a Seventh Grade Classroom. 1970-71.
INSTITUTION	Atlanta Public Schools, Ga.
SPONS AGENCY	Bureau of Elementary and Secondary Education (DHEW/OE), Washington, D.C.
PUB DATE	Oct 71
NOTE	43p.; Research and Development Report, Vol V, No 6
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Academic Achievement; *Behavior Change; *Behavior Problems; *Positive Reinforcement; *Problem Children

ABSTRACT

Maintaining orderly behavior in the classroom has traditionally been one of the major problems of teachers. The three experiments described in this report were designed to discover whether behavior management procedures can effectively control the high levels of disruption manifested by older children, whether reducing the level of disruption will be effective in increasing the academic performance of the children, and, if not, whether a motivation system can be designed which will lead to significant academic output. The subjects were a class of 19 seventh-grade children in a low-income elementary school in Atlanta who had a reputation for extreme behavior problems. The first experiment sought to bring discipline problems under control by means of a token-point reinforcement system; the second experiment sought to manage discipline problems through social influence and group reinforcement; the third experiment sought to improve academic performance through reinforcement. Results demonstrated that 1) discipline problems can be virtually eliminated through the application of appropriate behavioral procedures and 2) reinforcement for academic performance can significantly increase the academic level of a classroom group. It appears that the more widely behavior management techniques are used, the more effective school programs will be (MBM)

ED 059978

R E S E A R C H A N D D E V E L O P M E N T R E P O R T

Vol. V, No. 6 October, 1971

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

BEHAVIOR MODIFICATION IN A SEVENTH GRADE CLASSROOM

1970-71

Prepared by

Dr. Teodoro Ayllon, Director
The Laboratory for Applied Behavior Research
Georgia State University

Assisted by

William Emil Skuban, A. B.
Forrest Gerald McCullen, A. B.

Dr. Jarvis Barnes
Assistant Superintendent
for Research and Development

Dr. John W. Letson
Superintendent

Atlanta Public Schools
224 Central Avenue, S. W.
Atlanta, Georgia

TABLE OF CONTENTS

	Page
INTRODUCTION	1
METHOD	
Subjects	2
Setting	2
Personnel	2
Initial Problem	2
EXPERIMENT I: MANAGEMENT OF DISCIPLINE PROBLEMS THROUGH REINFORCEMENT	
Subjects	3
Response Definition	3
Method	4
GENERAL DESCRIPTION OF INTERVENTION PROGRAM: THE TOKEN-POINT SYSTEM	
Selection and Definition of Reinforcers	5
Point Exchange	6
Procedure	7
Experimental Design	8
The Experimental Analysis	8
The Statistical Analysis	8
RESULTS	9
Discussion	15
EXPERIMENT II: THE MANAGEMENT OF DISCIPLINE PROBLEMS THROUGH SOCIAL INFLUENCE	
Subjects	16
Response Definition	16
Method	16
Selection and Definition of the Reinforcers	16
Point Exchange	17
Procedures	17
Experimental Design	17
The Experimental Analysis	17
The Statistical Analysis	17
RESULTS	17
DISCUSSION	19
EXPERIMENT III: GENERATING ACADEMIC PERFORMANCE THROUGH REINFORCEMENT	20
Subjects	20
Response Definitions	20

TABLE OF CONTENTS (CONTD.)

	Page
Method	21
Selection and Definition of the Reinforcers	24
Point Exchange	24
Experimental Design	24
The Experimental Analysis	25
Performance Plateaus	25
Statistical Analysis	25
RESULTS	26
DISCUSSION	36
GENERAL DISCUSSION	36
REFERENCES	38

LIST OF TABLES

Number		Page
1	LIST OF BACK-UP REINFORCERS UTILIZED	6
2	AVERAGE TEACHER RATINGS OF DISRUPTION FOR THREE TARGET CHILDREN AND FOR THE OTHER 16 CHILDREN	15
3	LIST OF TEXTBOOKS AND WORKBOOKS UTILIZED	22
4	LIST OF NEW BACK-UP REINFORCERS UTILIZED	24
5	FREQUENCY OF PUPILS IN THE EXPERIMENTAL AND CONTROL GROUPS WHO SHOWED INCREASED OR DECREASED ACADEMIC PERFORMANCE ACROSS TWO ADMINISTRATIONS OF THE METROPOLITAN ACHIEVEMENT TEST	29
6	PERFORMANCE OF STUDENTS WHEN REINFORCED FOR CORRECT ACADEMIC PERFORMANCE (READING)	31
7	PERFORMANCE OF STUDENTS WHEN REINFORCED FOR FORRECT ACADEMIC PERFORMANCE (MATH)	32
8	GRADE LEVEL CHANGES FOR EXPERIMENTAL CLASS AS MEASURED BY REGULAR SCHOOL MATERIALS AND MAT GRADE EQUIVALENTS BY CHILD. FROM PRE- TO POST- = 60 CLASS DAYS	33
9	AVERAGE AMOUNT OF IMPROVEMENT, IN GRADE LEVELS, FOR THE EXPERIMENTAL CLASS AS MEASURED BY MAT AND REGULAR SCHOOL MATERIAL	34
10	THREE TARGET CHILDREN: PER CENT OF DISRUPTIVE BEHAVIOR, TEACHER RATINGS, AND READING GRADE LEVELS FOR TWO DIFFERENT CONDTIONS	35

LIST OF FIGURES

Number		Page
1	DISRUPTIVE BEHAVIOR FOR THREE TARGET CHILDREN	10
2	DISRUPTIVE BEHAVIOR: EDWARD - BASED ON 20 MINUTES OF OBSERVATION PER DAY	12
3	DISRUPTIVE BEHAVIOR: KENNETH - BASED ON 20 MINUTES OF OBSERVATIONS PER DAY	13
4	DISRUPTIVE BEHAVIOR: LEWIS - BASED ON 20 MINUTES OF OBSERVATIONS PER DAY	14
5	NUMBER OF "SOCIAL INFLUENCE" STATEMENTS MADE BY THE CLASS, AND THE AVERAGE PER CENT OF DISRUPTION FOR THE THREE TARGET CHILDREN	18
6	NUMBER OF TESTS TAKEN AND PASSED	27

PREFACE

During 1970-71 a study at Jessie Mae Jones School entitled Behavior Modification in a Seventh Grade Classroom, was funded under the Elementary and Secondary Education Act of 1965 (ESEA), Title I, and subcontracted to Dr. Teodoro Ayllon, Director, The Laboratory for Applied Behavior Research, Georgia State University. Mr. William Emil Skuban and Mr. Forrest Gerald McCullen of Georgia State University assisted Dr. Ayllon in conducting the study and in preparing the final report. Mr. Milton White, the principal at Jessie Mae Jones, gave unfailing support and sage advice; Mrs. Libby Tubbs, the teacher of the experimental class, was most patient and cooperative; and Mrs. Juanita Williams, the teacher aide of the experimental class, provided cheerful and generous cooperation. This report relates one of a series of studies in behavior modification which have been conducted by Dr. Ayllon and his staff under subcontract with the Atlanta Public Schools.

Jarvis Barnes
Assistant Superintendent
for Research and Development

I. INTRODUCTION

Maintaining orderly behavior within the classroom has traditionally been one problem of the major problems of teachers. Kleine and Pereira (1970) have pointed out that a content analysis of a teacher's activities within a class reveals that of the ten major areas of teacher activities which have been isolated, seven of these deal exclusively with the management and control aspects of the teacher's role. Recently, research in the area of applied behavior analysis has demonstrated that procedures based on systematic principles of reinforcement can be effective in maintaining classroom discipline (Osborne, 1969; O'Leary, Beeker, Evans, and Saudergas, 1969; Borrish, Saunders, and Wolf; 1969). Most of these studies have dealt with relatively short time spans and young children. While maintenance of discipline within the classroom is important, there is evidence (Glavin, Quay, and Werry; 1971) which suggests that simply reducing the level of disorder in a classroom is not sufficient for increasing academic performance. Therefore, it would seem imperative to shift the focus of attention to one of the "raison d'etre" of school systems; namely, academic achievement.

Any systematic investigation of pupil performance in a public school classroom would have to answer three major questions:

A. Can behavior management procedures effectively control the high (both qualitatively and quantitatively) levels of disruption manifested by older (e.g. 13 - 15 year olds) children?

B. Will reducing the level of disruption be effective in increasing the academic performance of the children?

C. If simply reducing the level of disruption does not, in and of itself, lead to improved academic performance, can a motivational system be designed which will lead to significant academic output?

II. METHOD

A. Subjects

The children for this project were drawn from a regular seventh grade classroom in an elementary school. An entire class of 19 children was selected for this study. There were six girls and 13 boys in the class; all the children were black. The age range of the children was 13 - 15 years. The children themselves had a reputation for extreme behavior problems which had been earned through violent misconduct during previous years, and the pupils were often referred to by school personnel as the worst class they had ever seen. The teacher was white and in her first year as a full-time teacher. The classroom routine for the school was "blocked" rather than departmentalized, which is to say that the same teacher taught the same children all subjects in one classroom.

B. Setting

The school itself is located on the south side of Atlanta, a racially mixed, low-income area. The physical layout of the school did not include a gymnasium, nor a place for children to play during inclement weather. The outdoor playground equipment was limited to two basketball goals on a dirt court.

C. Personnel

Local school personnel in this project included one regular full-time teacher and a teacher's aide two times per week for one hour each time. In addition, Dr. Teodoro Ayllon and two graduate students from Georgia State University, William Skuban and Gerald McCullen, were available for research purposes.

D. Initial Problem

Due to the children's past history and their behavior in the classroom when the project began, the major concern expressed by the teacher and other school personnel was with discipline. More specifically, the teacher was interested in reducing, if not eliminating, the high level of disruption of classroom routine.

Fights, shouting, and out-of-seat behavior presented themselves as problems early in the year; and the teacher, along with other school personnel, requested help in controlling the class. Preliminary observations corroborated this picture of the classroom. Fights broke out often, and the teacher could not get the children to listen to her instructions, to stay seated, or to remain quiet. At one point during baseline observations, the teacher told the observers that the project had better start soon because, "I can't take much more of this. If I don't get help soon, I'm getting out of here."

The objective of the behavioral intervention was to develop and implement procedures for the elimination of discipline problems. Experiment I was designed to meet this objective.

III. EXPERIMENT I: MANAGEMENT OF DISCIPLINE PROBLEMS THROUGH REINFORCEMENT

In order to bring the discipline problems under control, a series of procedures were explored which culminated in a rather straight-forward method for managing discipline problems.

A. Subjects

The subjects for the experimental program on discipline problems were chosen from the entire class of 19 children. During the pre-baseline period, direct observations were made by the researchers on all the children, and the teacher also rated each child on a scale of disruptiveness. Three children were consistently the highest on both measures; therefore, those three (Edward, Kenneth, and Lewis) were chosen as "target children" for the present study.

B. Response Definition

The response definition for disruptive behavior followed that of Becker (Madsen, Arnold, and Thomas) as follows:

1. Noise behaviors: loud talking, singing, clapping, shouting out the teacher's name, and loud laughing.

2. Gross motor behaviors: out of seat without permission, fighting, slapping, foot stomping, and throwing objects -- all were considered disruptive.

Any other behaviors than those listed above were considered nondisruptive.

C. Method

Measures of disruptive behavior were taken each class day. The period of observation was usually from 9:00 to 11:00 a.m. Each of the three target children was observed for five four minute blocks, totalling 20 minutes each. Thus, the total observation time for all three target children was one hour. The unit of observation (four minutes) was divided into ten second intervals. With a stop watch and a data pad, the observers recorded during each ten second interval, for each child, whether during that interval the child had exhibited any disruptive behavior. If he had, a slash was placed in the square designating that interval. Once the four minute observation period was begun for a child, recording continued until the time elapsed. Observations were discontinued when the children were not in the classroom, such as during reinforcing activities, assemblies, library time, etc. Each child, then, was observed for 120 ten second intervals each day. The number of disruptive intervals over the total number of intervals yielded the percentage of disruptions.

Reliability checks on the primary measure of disruption were made once each week. Two observers would observe each target child for 20 minutes, as in the regular observation procedure, thus totalling 60 minutes of observation. The number of intervals on which they agreed divided by the total number of intervals yielded a percentage of agreement. The range of reliability measures fell between 86 per cent and 94 per cent with a mean of 91 per cent.

Along with this primary measure of disruption, consideration was given to the teacher's own definition of the disruption occurring in the classroom. In this case disruption was defined as the rating on a scale from one to five of each child, each day. A rating of 1

represented no disruption, and five represented extreme disruption. The teacher ratings were obtained each day prior to the departure of the experimenters.

IV. GENERAL DESCRIPTION OF INTERVENTION PROGRAM: THE TOKEN-POINT SYSTEM

To bring disruptive behavior under control, a token-point system was developed. Briefly, this system enabled the child to earn recognition (points) for his efforts. Points could then be exchanged for a wide range of items and privileges.

Prices and performance requirements were explicitly and publicly stated each week. Each Monday, a "Rule and Price Sheet" was mimeographed, posted on the bulletin board, and handed to each child. On this sheet, prices in points appeared for the reinforcers, and rules governing earning procedures for that week were specified.

A. Selection and Definition of Reinforcers

An effort was made in this study to select back-up reinforcers which met the following criteria:

1. Naturally available in the school environment.

2. Relatively inexpensive.

Opportunities were available throughout the day for the purchase of many reinforcers, such as a half-day off or bathroom privileges. Other reinforcers were made available only at their regular scheduled time. For example, recess was available every day at 2:00 p.m., but chorus and art classes were available only once each week. Finally, each Friday an auction was held to allow the children an opportunity to spend points which they had accumulated (but not spent) during the week. Table 1 presents a summary of the items available for exchange and the cost of each item.

TABLE 1

LIST OF BACK-UP REINFORCERS UTILIZED

Item or Activity	Cost
RECESS - 45 minutes outside the school.	5 - 20 points.
BASKETBALL - 45 minutes in the gym. of Carver High School.	15 - 20 points.
MAGAZINES - Sports Illustrated, etc.	10 - points or highest number of points bid at weekly auction.
CHORUS - Access to chorus for 60 minutes.	7 - points.
FIVE MINUTE BREAK - Outside the classroom.	5 - points.
ART CLASS - One hour.	5 - points.
GAME ROOM - 20 minutes access to a special "game room."	15 - 20 points.
COMIC BOOKS - Fantastic Four, etc.	10 - points or highest number of points bid at weekly auction.
ONE PIECE OF CAKE - Section of home-made cake.	Number of points bid by highest bidder at weekly auction.
ACCESS TO BATHROOM - 2 minutes.	2 - points.
FIELD TRIPS - At least a half-day trip.	20 - points.
GYM - 45 minutes access to the Jessie Mae Jones gym.	10 - 20 points.

B. Point Exchange

Each child had for each day a 3" x 5" card upon which appeared the date, the name of the child, the number of points he had earned during the day, and the cost of the back-up reinforcers.

In order to gain access to any of the back-up reinforcers, the child had to present his card to the teacher. If the teacher observed that the child had enough points on his card to purchase that item or activity, she simply punched the price of the item or activity from his card by using a hole puncher. If he did not have enough points, he returned to his seat.

C. Procedure

The procedure was designed differentially to reinforce behaviors other than disruption on both an individual and a group basis. The procedure was as follows: The school day was divided into 15 minute segments, with the use of a kitchen timer. The teacher would set the timer and announce to the class, "O.K., the timer is set. If you are quiet and stay in your seats for 15 minutes, everyone will receive a point." Each child's name appeared on a ruled ditto sheet which the teacher kept on a clipboard. The sheet was divided into squares representing the 15 minute segments. If the teacher observed a child engaging in disruptive behavior during the 15 minute period, she would announce, "Marion, that's one; you're talking, so you have lost your point for this period." The child would not be able to earn another point until the 15 minute period was over and another began. If another child was observed by the teacher to be disruptive, the same procedure was carried out for that child. The other children, however, still retained their ability to earn the point for that period by remaining quiet. However, if the teacher observed the same child engaging in disruptive acts for a second time during a single 15 minute period, she would say to him, "Marion, that's two; you're talking again; class, everyone has lost his point because Marion was talking." Now everyone in the entire class was without his point. Upon the occurrence of disruption for the third time by the same child, the teacher was further instructed to eject the child from the classroom, and the child would lose all the points that he had earned. He was escorted to another room, where in order to return to class, the child had to write a specified sentence 500 times. (An average of about four children per week were removed from class under this procedure.) When the 15 minute period was over, the timer would ring, and the teacher would reset it and announce that the class now had another opportunity to earn a "quiet point." Initially, the children were awarded points for nondisruption which they could exchange that same day. The final procedure involved crediting points for nondisruption on individual cards after each class day. Each morning the children

received fresh cards with all the points which they had earned the previous day. The cards were good only for that one day, as the children had to turn in their cards at the end of each day. Residual points were carried over to the next day's card.

D. Experimental Design

The basic design utilized in this experiment was as follows:

1. An experimental analysis.

2. A statistical analysis.

E. The Experimental Analysis

An attempt was made experimentally to pinpoint what relationship, if any, existed between various reinforcement contingencies and the disruptive behavior of the class. To do this, a baseline of disruptive behavior was first obtained under conditions of no reinforcement. Next, a period of reinforcement for nondisruptive behavior was introduced. Then this reinforcement procedure was withdrawn for a time, and, finally, reinstated once again. Whenever the point system for controlling disruption was discontinued, the teacher returned to the procedures that she had used during the baseline, i. e. using verbal means to discipline the children. The objective measures of disruption were continuously recorded, as were the teacher's ratings of the level of disruptiveness. To the extent that the reinforcement contingencies controlled the children's behavior, the level of disruption should vary in inverse relationship to the presence or absence of reinforcement.

F. The Statistical Analysis

In addition to the experimental analysis, a statistical analysis was utilized in order to determine whether or not the differences in level of disruption during reinforcement (as opposed to non-reinforcement) were significant.

V. RESULTS

The results of the effort to manage discipline problems were perhaps the strongest aspect of the program. The teacher was able to reduce disruptive behavior to what she considered "acceptable" levels whenever she wished, by simply applying the proper reinforcement contingencies. Figure 1 shows an experimental analysis of disruptive behavior for all three target children. The first segment in Figure 1 shows that during the baseline period of observation the three target children were disruptive approximately 50 per cent of the time. When the procedure for control of discipline was introduced, on day six, there was an immediate and drastic reduction in the level of disruptive behavior from 50 per cent to 12 per cent. For the eight days of this procedure the improvement was maintained. On day 14, when the behavioral procedures for control of discipline problems were removed, there was a return to the level of disruption previously observed. Again, when the procedure for the control of discipline was reintroduced on day 18, the children's average level of disruption was reduced from 57 per cent to 12 per cent, and remained below this level for the duration of this period. Throughout the 20 days of this experiment the children continued to receive reinforcement for correct academic performance, thus holding this factor stable for all phases of the experiment.

15

N=3

DISRUPTIVE BEHAVIOR FOR THREE TARGET CHILDREN
(AVERAGED - EACH CHILD OBSERVED 20' PER DAY)

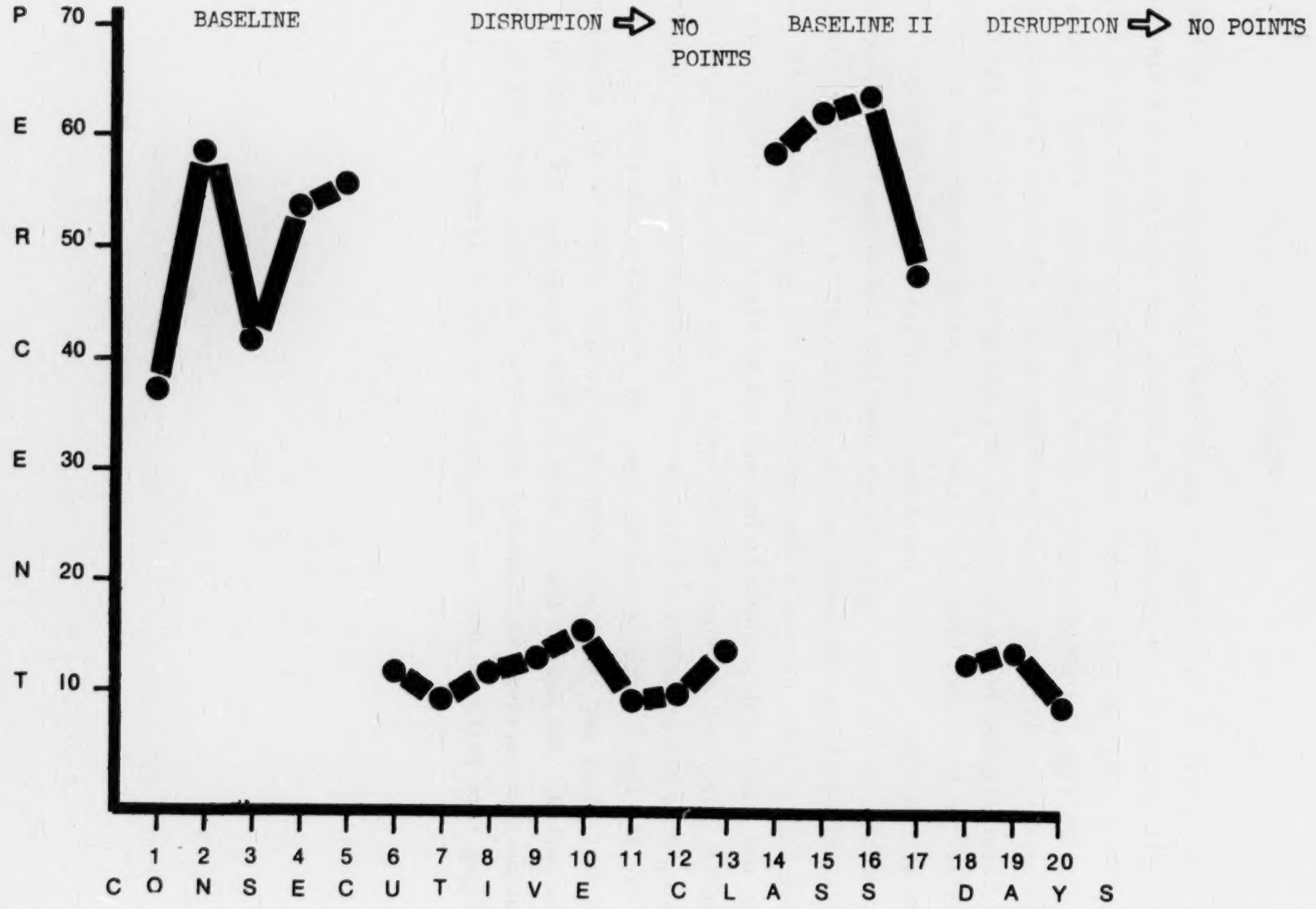


FIGURE 1

Figures 2, 3, and 4 are individual graphs for each of the three target children over each of the phases discussed for Figure 1. It can be seen that the disruptive behavior of <u>each</u> of the three target children was maintained at a high level when the teacher did not use behavioral techniques, and was virtually eliminated whenever she utilized these techniques.

A point biserial correlation coefficient (r_{pbi}) was computed between the two experimental conditions and on the frequency of disruptive behavior for each of the three target children, individually and on all of the target children combined. The values of r_{pbi} were .98 for Edward, .87 for Kenneth, .88 for Lewis, and .96 for all three children combined. These values of r_{pbi} were all highly significant ($p < .0005$), and they clearly support the contention that decreases in disruptive behavior levels were related to the reinforcement conditions used in the experiment.

DISRUPTIVE BEHAVIOR: EDWARD _ BASED ON 20
MINUTES OF OBSERVATION PER DAY

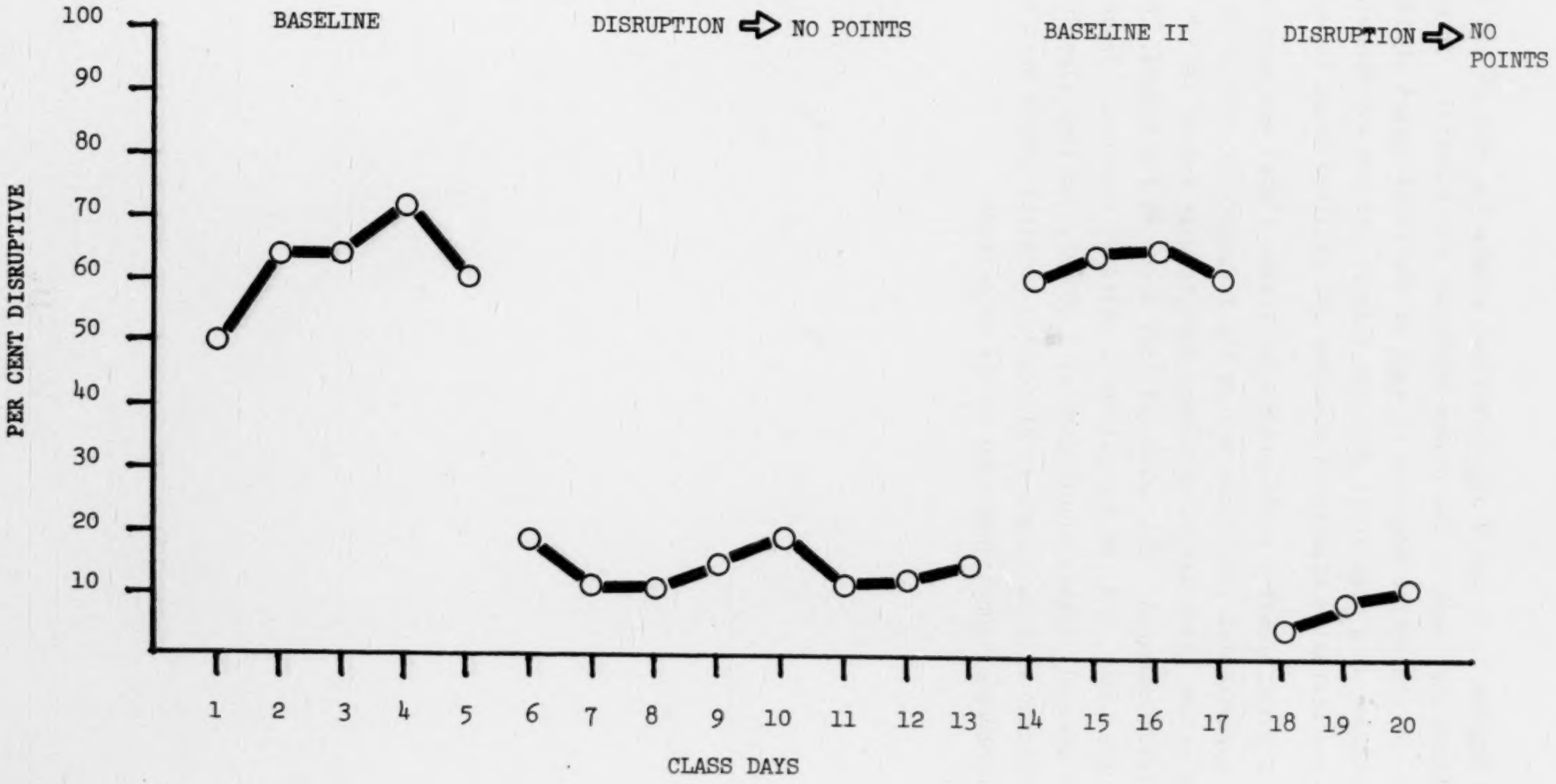


FIGURE 2.

DISRUPTIVE BEHAVIOR: KENNETH - BASED ON 20 MINUTES OF OBSERVATION PER DAY

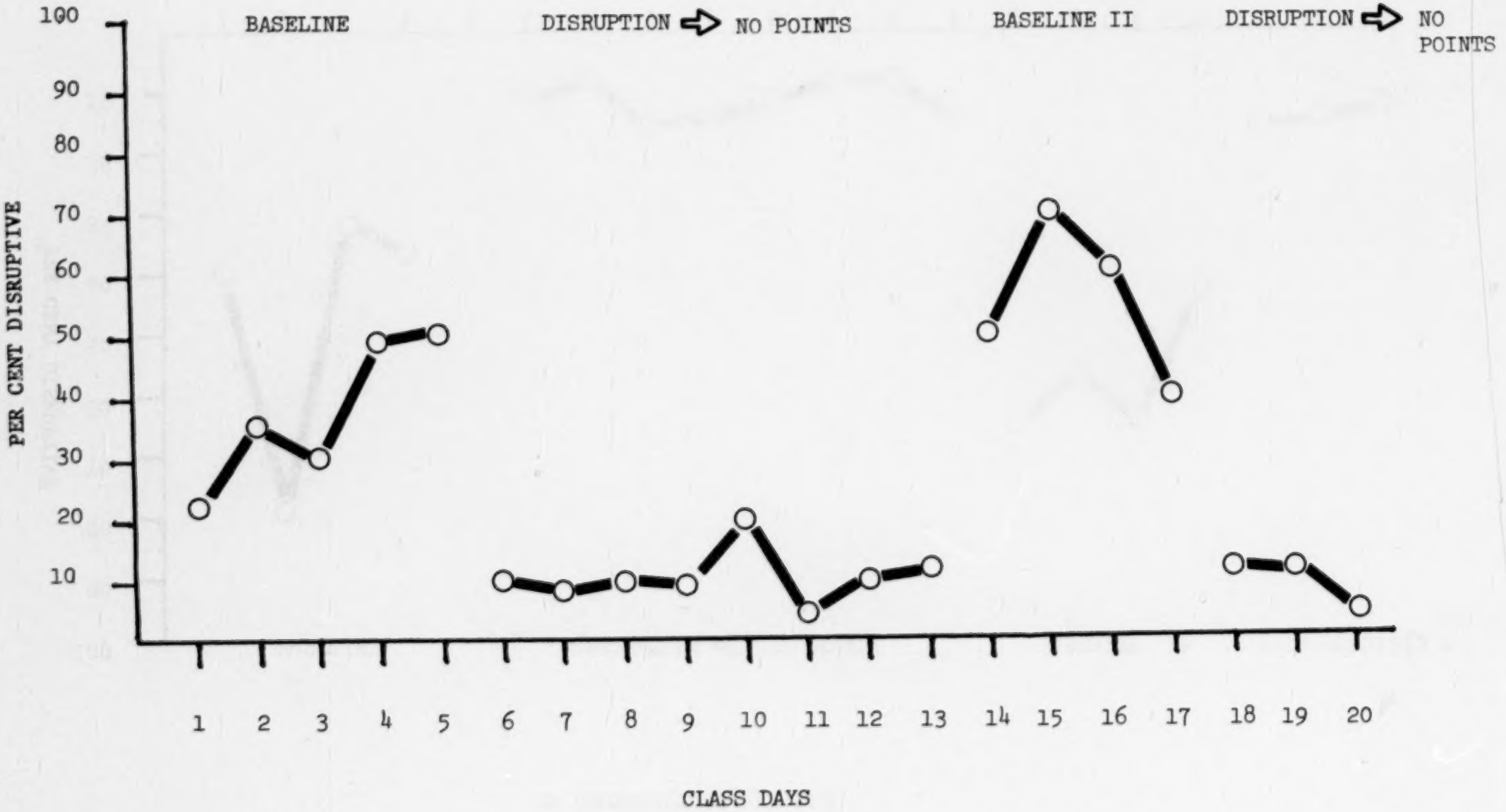


FIGURE 3.

DISRUPTIVE BEHAVIOR: LEWIS - BASED ON 20 MINUTES OF OBSERVATIONS PER DAY

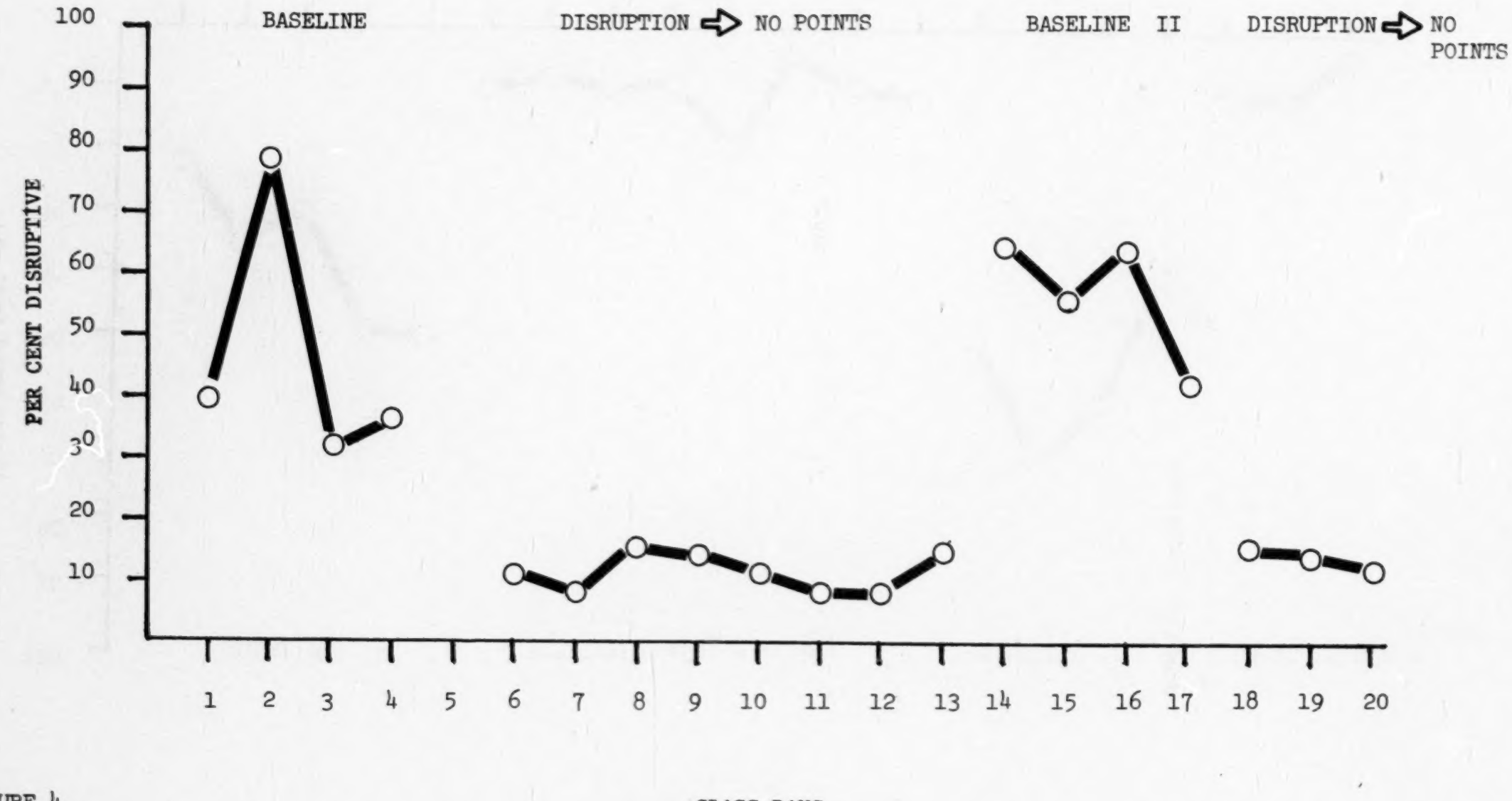


FIGURE 4.

As a collateral measure of the level of disruption, the teacher was asked each day to fill out a rating scale for each child. Averaging the ratings given the three target children and then averaging the ratings of the other 16 children give a reflection of the teacher's perception of what children were most disruptive during a given day or period of days. Table 2 shows that during the first phase of this experiment, the three target children were rated as being almost twice as disruptive as the other children in the class (4.62 vs. 2.90). During the second phase after the procedures for the control of discipline problems had been introduced, the three target children were rated as being no more disruptive than the other 16 children in the class (1.93 vs. 1.53). When the reinforcement procedures for the control of discipline problems were removed during the third phase, the ratings of disruptiveness rose for both groups, and once again the teacher began to rate the three target children as being more disruptive.

TABLE 2

AVERAGE TEACHER RATINGS OF DISRUPTION
FOR THREE TARGET CHILDREN AND FOR THE OTHER 16 CHILDREN *

Number Children	Baseline	Good Behavior Points	Baseline	Good Behavior Points
3	4.62	1.93	3.50	2.10
16	2.90	1.53	2.42	2.00

* Each rating period was based on five days except for the last period which was based on three days.

A. Discussion

The results of Experiment I indicated that disruptive behavior can be controlled by differentially reinforcing behaviors that compete with disruption. The disruptive behavior of each of the three target children was quickly and effectively controlled when the teacher used the appropriate reinforcement procedures. During the course of this experiment, many remarks made by the children seemed to have differential effects on the level of disruption of some of the children. The

question then arose as to the relationship between this "social pressure," manifiested in the form of verbal statements, and the presence or absence of reinforcement procedures. The objective of Experiment II was to examine this relationship.

VI. EXPERIMENT II: THE MANAGEMENT OF DISCIPLINE PROBLEMS THROUGH SOCIAL INFLUENCE

Experiment II was concerned with the same contingencies as Experiment I and included systematic measurement of the verbal statements made by the children throughout the experiment.

A. Subjects

In addition to the three target children from Experiment I, this experiment included the remaining 16 children from the class for a total of 19 subjects.

B. Response Definition

Social influence was defined as any statement made by one child to another that attempted to exercise control over the second child, or prompted him to conform to the contingencies in effect, so that the group would receive the maximal amount of reinforcement. Examples of such statements are: "Shut up"; "Be quite (name)"; "Sit down now"; "Hush"; and "Stop that" (in reference to a disruptive activity). A frequency count of these statements was made on a daily basis. Reliability checks were carried out weekly, and inter-observer agreement ranged from 93 per cent to 96 per cent with a mean of 92 per cent.

C. Method

The method for this experiment was identical with that employed during the management of discipline as described in Experiment I. In addition, a frequency count was made daily of "social influence" statements voiced by the class members.

1. Selection and Definition of the Reinforcers

The reinforcers utilized were identical with those previously described (see Table 1).

2. Point Exchange

The point exchange took place in the same manner as previously described in the discipline management section.

3. Procedures

The procedures were identical with those employed in the discipline management section.

D. Experimental Design

The experimental design for this experiment encompassed two aspects, involving both an experimental analysis of the relationships as well as a statistical evaluation of the significance of the relationships.

1. The Experimental Analysis

For the experimental analysis, both social influence for the 19 children and level of disruption for the three target children were first measured in the absence of any systematic reinforcement contingencies. The reinforcement procedures were then implemented for a period, withdrawn, and finally implemented again while measurements in the two critical variables, social influence statements and level of disruption, were continually recorded.

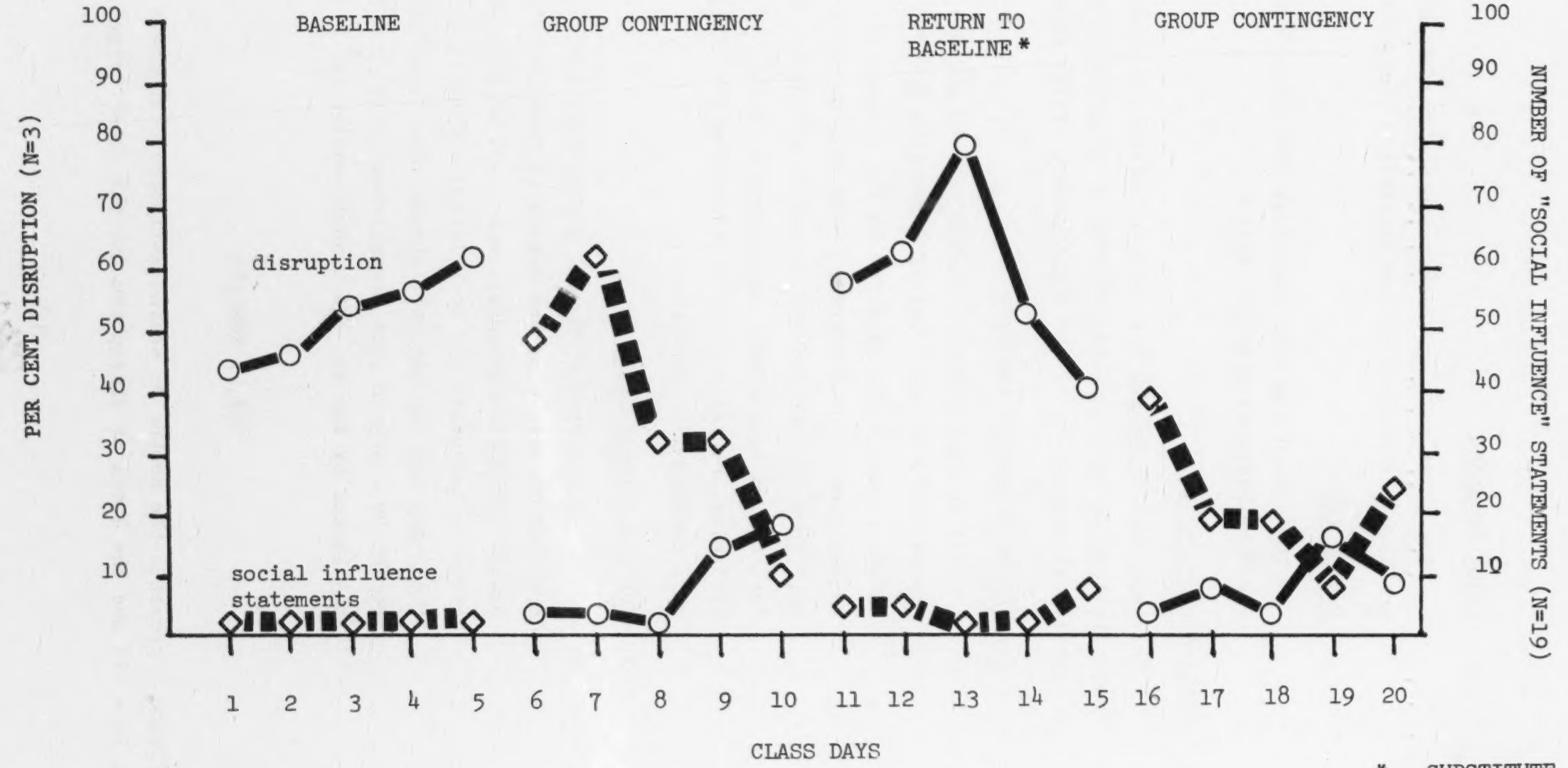
2. The Statistical Analysis

A Pearson Product Moment Correlation Coefficient was employed to determine the degree of relationship between social influence statements and level of disruption. In order to calculate the correlation coefficient, both the frequency and the per cent scores were transformed; the former by a square root transformation ($x^1 = \sqrt{x} + \sqrt{x+1}$) and the latter by the arc sin transformation ($p^1 = 2 \text{ arc sin } \sqrt{p}$).

VII. RESULTS

Figure 5 presents the number of social influence statements of the entire class (n = 19) and the level of disruption for the three target children.

NUMBER OF "SOCIAL INFLUENCE" STATEMENTS MADE BY THE CLASS, AND
THE AVERAGE PERCENT OF DISRUPTION FOR THE THREE TARGET CHILDREN



* - SUBSTITUTE TEACHER

FIGURE 5.

The frequency of social influence statements and the per cent of disruptive behavior were highly correlated with one another. As social influence statements increased, instances of disruptive behavior decreased ($r = -.83$; $p < .005$, one tailed). This would seem to suggest that social influence can control the behavior of the group members when the appropriate environmental or reinforcement contingencies make this an advantage.

VIII. DISCUSSION

The results of this experiment reveal that when there were no reinforcement contingencies present, and disruption was very high, there were very few, or no, social influence statements. However, when a group reinforcement contingency was established, and the children began to be affected by the consequences of the behavior of their peers, then they made attempts to control the behavior of their peers. It is interesting to note, however, that approximately 70 per cent of the social influence statements were emitted by the three target children. This indicates that these children were not only the "leaders" in level of disruptive behavior, but also they were the leaders in establishing and maintaining classroom discipline when the contingencies were properly arranged. It should be noted that on days 11-15 a substitute teacher was utilized, since the regular teacher was in the hospital.

Although Experiments I and II showed that classroom disruption could be brought under control by the application of reinforcement procedures, gross observations on the part of both the experimenters and the teacher revealed that reducing the level of disruption did not result in any noticeable increases in academic performance. The January administration of the Metropolitan Achievement Test (MAT) corroborated this observation in that there were no changes in these scores and the scores made on the same test administered four months previously.

These findings indicate that, contrary to the teacher's expectations, there was no facilitation of academic achievement despite the elimination of classroom disruption. Accordingly, since academic performance is the basic consideration of any educational system, an attempt was made to design procedures to improve the academic performance of the entire class.

IX. EXPERIMENT III
GENERATING ACADEMIC PERFORMANCE THROUGH REINFORCEMENT

The procedures for the control of disruptive behavior developed in Experiments I and II were found to be specific in their effectiveness; therefore, they were continued as standard classroom procedures. Concurrently, a reinforcement system for enhancement of academic performance was introduced in Experiment III. Three major dimensions were selected to evaluate the effects of the reinforcement contingencies upon academic performance as follows: (1) Specific day-to-day classroom performance as measured by number of tests taken and number of tests passed; (2) number of performance plateaus advanced as measured by academic grade levels; and (3) academic achievement as measured by the Metropolitan Achievement Test (MAT).

A. Subjects

The subject population involved two seventh grade classes from the same school; one was the original class used in Experiments I and II, which served as the experimental (E) group, and the other was the control group (C). The E class contained 13 boys and 6 girls, while the C class contained 8 girls and 7 boys. The average intelligence quotient (IQ) on the California Test of Mental Maturity (CTMM) for the E class was 82.6 (range 47-118), and for the C class the average was 86.8 (range 60-125).

For the analysis of day-to-day test performance, only 18 of the total 19 pupils (E class) were present often enough to be included in the analysis. All of the 19 children from the E class were included in the analysis of performance plateau improvement, but because of absences and/or incomplete test data, the final number for each classt in the MAT comparison was 15 for the experimental class and 12 for the control group.

B. Response Definitions

Daily academic performance served as the basis upon which an evaluation could be made to determine the effects of a reinforcement program on the rate of academic performance. Thus, the following two measures were utilized:

1. The number of tests the E class elected to take daily in arithmetic and reading.

2. The number of tests that the E class passed. The first of these measures provided a measure of motivation of the E class to undertake academic behaviors. This motivational level was an important component of the second measure which more directly reflected correct academic performance. An additional measure utilized, again based upon the E class and the regular public school materials, was that of performance plateaus. A child was considered to have advanced from one performance plateau to another whenever he had passed a test over all the work encompassed in one grade level. If a child, after being given a certain grade level workbook, could perform 70 per cent of the items correctly on a test drawn from that workbook, then both functionally and behaviorally he had mastered that grade level as defined by the workbook. Presumably, to be able to pass the test he must have mastered the skills required for that grade level. Thus, he had progressed one grade level or performance plateau. The same definition was utilized for both reading and arithmetic.

C. Method

The intervention program for academic performance concentrated on two subject areas, arithmetic and reading. Table 3 presents a list of the textbooks and workbooks utilized in this project.

TABLE 3

LIST OF TEXTBOOKS AND WORKBOOKS UTILIZED

ARITHMETIC	
Advancing With Mathematics.	Deans, McMeen, Beigel, Evans. American Book Company. Mathematics in Action Series. Books 3 through 7.
READING	
Reading for Meaning Series.	Paul McKee, M. Lucile Harrison, Annie McCowen, and Elizabeth Lehr. Houghton Mifflin Company. Readiness level through grade 7.
Great American Classics.	Paperback books for pupils who had completed grade 7.

The program involved an approach which could be described as free operant. Academic material suitable to each child's grade level was made available daily. Starting from his grade level, the child could engage in as much or as little academic behavior as he wished. No specific assignments were given by the teacher in either of these two subject areas. The more work the child did, the more recognition he received in the form of points.

The intervention procedure for increasing academic performance was as follows: Each child was tested in both mathematics and reading to assess his performance in terms of the current grade level at which he was functioning. These tests were constructed from the regular public school academic materials in reading and arithmetic. The point at which the child stopped getting 70 per cent of the items correct was where he was placed to begin the program. In the case of reading, for example, a child may have been able to pass a test over the second grade workbook (test items were drawn directly from the text), but not the third grade. He then was placed in the third grade workbook and was told that he might work as fast or as slowly as he wished, but that the more work he did, the more points he would receive. The same procedure was followed for assessment and placement in arithmetic.

Once the child was placed at his level in both subject areas, the rules of the program became the same for all children in both subject areas. The reading workbooks were divided into chapters. Each ten pages in the reading workbook was considered a chapter. The child was given freedom to do as many or as few of the pages in each chapter as he wished. However, he received points for pages of correct academic work handed in from his chapter. At any time he might request to take a test over the entire chapter. This test consisted of one or two pages of the reading workbook itself. If the child passed the chapter test, he received points (usually 15) and permission to hand in homework from the next chapter, for which he could then receive points (usually one per page). He was free to take the next chapter test whenever he chose. This same procedure was followed for arithmetic, using a text which already was conveniently divided into chapters. If the child failed a test on a chapter, he would not be given credit or points for the test or for work handed in on the next chapter. Further, he was required to retake a different form of the same chapter test whenever he felt he was ready. This next time, however, he had to pay two points to retake the test. This was instituted to reduce spurious test-taking. After the grading of each test by the teacher at night, the teacher and the pupil would schedule a conference and review the test together. In addition to this progression procedure, there also were tests available over the entire grade level for both subject areas. These "section" tests also were obtainable at the pupil's request. They were more extensive, but still drawn directly from the materials. These tests were available for a fee of five points each time they were requested. Passing a grade level was reinforced with a trophy and free days off from class routine.

Each evening the teacher would grade the tests taken that day and the homework handed in that day. Points earned by the pupil were placed on his "point card" so that he might spend them the next day. The teacher also marked the child's place, or progress, in a point book. Correct pages handed in by the child were marked off in the book, so that the teacher might keep an exact record of where each child was at any given time.

1. Selection and Definition of the Reinforcers

The reinforcers utilized in enhancing academic performance were identical with those utilized in increasing nondisruptive behavior (see Table 1) except that several reinforcers were added which could only be earned through academic performance. Table 4 presents a summary of those "new" reinforcers and their cost in points.

TABLE 4

LIST OF NEW BACK-UP REINFORCERS UTILIZED

Item or Activity	Cost
Small trophies (with figurines)	Pass one grade level (mathematics or reading).
1/2 day off from the academic work	20 - 40 points
Whole day off from regular academic day	Pass one grade level
Coca-cola (in the game room)	5 - points
Pop corn (at the weekly movie)	5 - points
Assistantships (helping other school personnel for 1/2 day	Pass one grade level
Section test (grade level)	5 - points
Movie - a weekly movie of approx. 45 minutes duration.	20 - points.

2. Point Exchange

The token exchange occurred in the manner previously described except that now the children might choose their trophy and choose to take any day off from academic work once they had passed a section test (one grade level).

D. Experimental Design

The experimental design for academic performance involved three components: (1) an experimental analysis of number of tests taken and passed, (2) a statistical comparison of pre- and post-program

scores for the experimental and control classes on preselected subtests of the Metropolitan Achievement Test, and (3) the number of performance plateaus advanced as measured by academic grade levels.

1. The Experimental Analysis

Once the children could earn points by passing tests, an attempt was made to determine the effectiveness of the point systems' generating and maintaining academic performance. Daily measures were taken of the number of tests that the children chose to take and of the number of tests on which the children scored 70 per cent or more items correctly. These measures were taken under three conditions:

a. Reinforcement for scoring 70 per cent or more items correctly on tests while receiving additional reinforcement for nondisruptive behavior.

b. No reinforcement for achievement on tests but receiving reinforcement for nondisruptive behavior.

c. Reinforcement for scoring 70 per cent or more items correctly on tests while receiving no additional reinforcement for nondisruptive behavior.

Differences in number of tests taken and passed during the three conditions should reflect the extent to which the reinforcement system controlled the academic performance of the children.

2. Performance Plateaus

Once the pupils were empirically placed at the academic level at which they could begin to do correct work, an analysis was conducted of the number of "grade levels" each pupil advanced during the 60 academic days of the program.

3. Statistical Analysis

The statistical tests involved comparisons between the

experimental and control classes on pre- and post-program administrations of the Metropolitan Achievement Test. The subtests on which statistical comparisons were made were those which involved the two included in the experiment, subjects arithmetic and reading.

X. RESULTS

In order to get a measure of the degree to which reinforcement procedures affected academic performance, an experimental analysis was performed. Since the children could take tests whenever they chose to, measures of the number of tests taken and passed were gathered under the following conditions:

A. Reinforcement for scoring 70 per cent or more items correctly on tests while receiving additional reinforcement for nondisruptive behavior.

B. No reinforcement for achievement on tests but receiving reinforcement for nondisruptive behavior.

C. Reinforcement for scoring 70 per cent or more items correctly on tests while receiving no additional reinforcement for nondisruptive behavior.

Figure 6 indicates that under conditions of reinforcement for academic performance, the children took and passed tests at a much higher rate than under conditions of no reinforcement for correct academic performance. During the first five days of this experiment, when the procedures of reinforcement for correct academic performance were in effect, the children were taking an average of about ten tests per day and were passing over 60 per cent of those taken. During the second phase when there was no reinforcement for academic performance, the rate of test taking declined drastically from ten to about two tests per day. The rate of tests passed also decline from about seven per day to less than one per day. During the third phase, as reinforcement was reinstated (days 10-14), the rate of passing tests again increased to approximately five per day.

NUMBER OF TESTS TAKEN AND PASSED

N = 18

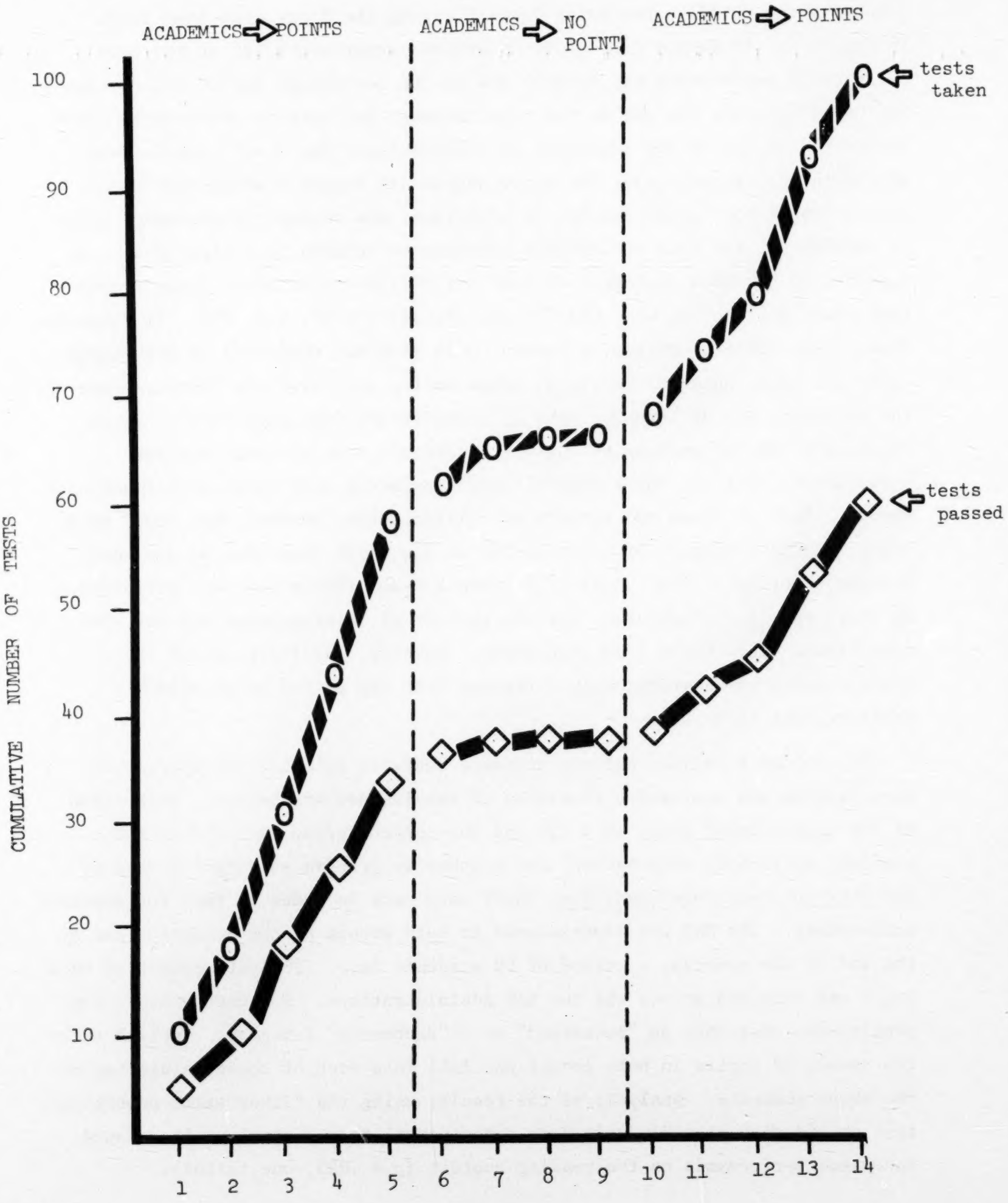


FIGURE 6.

An additional method used to maximize academic performance was to reinforce the children for being "quiet" during the first nine days shown in Figure 6. It seemed prudent to determine, experimentally, if the rate of academic performance was largely due to the concurrent use of reinforcement for "good" conduct and not to the reinforcement for correct performance alone. Therefore, on day 10 the procedure of reinforcement for "good" conduct was discontinued. Accordingly, the third segment in Figure 6 shows that when reinforcement for "good" conduct is withdrawn, and academic performance alone is reinforced, the rate of academic performance returns to a high level. An analysis of variance performed to test for difference in tests taken showed that these differences were significant ($F,2,42 = 6.99$, $p < .01$). To determine where these differences lay, a Newman-Keuls test was performed on both tests taken and tests passed. For tests taken during the first and third periods of the analysis, the differences were not significant from each other. Since these were the two periods during which academic reinforcement was the independent variable, these results were consistent with those of a functional nature. Each of these two periods of reinforcement, however, was found to be significantly different from the period during which there was no academic reinforcement ($p < .05$). Similarly, when a Newman-Keuls test was performed on tests passed, as expected, the two periods of reinforcement did not show significant differences from each other. However, the first period of reinforcement was significantly different from the period of no academic reinforcement ($p < .01$).

It will be recalled that the academic subjects selected for behavioral intervention and evaluation consisted of reading and arithmetic. Comparison of the experimental group ($N = 15$) and the control group ($N = 12$) on the reading, arithmetic computation, and arithmetic problem solving subtests of the Metropolitan Achievement Test (MAT) were made in order to test for academic achievement. The MAT was administered to both groups at the beginning and at the end of the program, a period of 60 academic days. The performance of each pupil was compared across the two MAT administrations. For each subtest the pupils were cast into an "increased" or a "decreased" category. Table 5 shows the number of pupils in both groups who fell into each of these categories on the three subtests. Analysis of the results using the Fisher exact probability test showed that significantly more experimental than control pupils showed increased performance on the reading subtest ($p < .025$, one tailed).

TABLE 5

FREQUENCY OF PUPILS IN THE EXPERIMENTAL AND CONTROL GROUPS WHO SHOWED INCREASED OR DECREASED ACADEMIC PERFORMANCE ACROSS TWO ADMINISTRATIONS OF THE METROPOLITAN ACHIEVEMENT TEST

READING SUBTEST *

	No. of Pupils Who Increased	No. of Pupils Who Decreased
EXPERIMENTAL GROUP. N=15	11	4
CONTROL GROUP. N=12	3	9

ARITHMETIC COMPUTATION SUBTEST

	No. of Pupils Who Increased	No. of Pupils Who Decreased
EXPERIMENTAL GROUP. N=15	10	5
CONTROL GROUP. N=12	6	6

ARITHMETIC PROBLEM SOLVING SUBTEST

	No. of Pupils Who Increased	No. of Pupils Who Decreased
EXPERIMENTAL GROUP. N=15	9	6
CONTROL GROUP. N=12	8	4

* Significant.

Measures on the actual differences between the two scores for each experimental pupil on the arithmetic computation subtest showed a significant increase in performance from the beginning to the end of the program [$t(14df) = 2.48$, $p < .05$, one tailed]. A similar test for the control pupils did not show any significant change.

An additional evaluation of progress made in reading and arithmetic consisted of determining empirically the grade level of each of the 19 children prior to and subsequent to the behavioral intervention. Table 6 indicates that in 60 academic days, 13 of the 19 children advanced one grade level or more in reading. Three of the 13 children advanced 3 or more grade levels in 60 academic days, while the remaining 10 children advanced either 1 or 2 grade levels.

For arithmetic, Table 7 shows that in 60 academic days, 10 of the 19 children advanced at least 1 grade level. Of these 10 pupils, 5 children advanced 2 grade levels.

TABLE 6

Performance of Students When Reinforced For Correct Academic Performance

READING*

number of students who advanced <u>one</u> <u>or</u> <u>two</u> grade levels	10
number of students who advanced <u>three</u> <u>or</u> <u>four</u> grade levels	3
number of students who remained at the same grade level	6
total number of students	19

*based on 60 consecutive class days

TABLE 7

Performance of Students When Reinforced For Correct Academic Performance

MATH*

number of students who advanced one grade level	5
number of students who advanced two grade levels	5
number of students who remained at the same grade level	9
total number of students	19

* based on 60 consecutive class days

Table 8 shows the grade level changes in both reading and arithmetic for the experimental class, by individual child. Also for each child his grade equivalent on the Metropolitan Achievement Test (MAT) is shown for comparison purposes. The grade equivalent on the MAT for arithmetic was obtained by averaging the grade equivalents on both subtests (Arithmetic Composition and Arithmetic Problem Solving).

TABLE 8

GRADE LEVEL CHANGES FOR EXPERIMENTAL CLASS AS MEASURED BY REGULAR SCHOOL MATERIALS AND MAT GRADE EQUIVALENTS BY CHILD. FROM PRE- TO POST- = 60 CLASS DAYS

Pupils	READING				ARITHMETIC			
	Regular School Materials		MAT		Regular School Materials		MAT	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1.	6.0	7.0	4.0	3.2	5.0	5.0	5.9	6.2
2.	7.0	7.0	4.7	4.2	6.0	8.0	6.4	7.5
3.	7.0	7.0	4.4	4.7	6.0	8.0	5.5	5.4
4.	5.0	6.0	3.3	4.2	4.0	4.0	4.9	4.6
5.	3.0	4.0	3.0	4.0	3.0	4.0	5.7	6.1
6.	7.0	7.0	7.3	6.6	5.0	5.0	5.5	5.5
7.	pre-primer	2.0	3.2	3.5	2.0	3.0	4.9	5.7
8.	7.0	7.0	8.7	10.0	7.0	8.0	6.3	7.6
9.	5.0	7.0	4.9	6.3	6.0	8.0	5.1	5.8
10.	7.0	7.0	8.0	9.9	7.0	8.0	5.3	7.0
11.	2.0	3.0	4.0	4.5	2.0	3.0	5.2	5.8
12.	6.0	7.0	4.0	5.1	5.0	5.0	5.4	6.4
13.	5.0	6.0	4.5	4.9	6.0	8.0	6.0	6.6
14.	7.0	7.0	8.3	8.5	6.0	8.0	6.0	5.8
15.	4.0	5.0	4.4	3.0	4.0	4.0	6.0	5.8

Looking in Table 8 at the grade equivalent scores on the MAT for reading, one can see that of the 15 children tested, 7 showed an increase of at least 0.5 of a grade level from pre- to post-testing. Four other children decreased at least 0.5 of a grade level, and 4 others showed an increase amount to less than 0.5 of a grade level. Of the 7 children who showed a substantial increase on the MAT, 5 showed a concomitant increase of at least one grade level on the regular reading materials utilized in the project. Somewhat surprisingly, of the 15 children tested 2 showed a "contradictory" change pattern with respect to the two measures, both pupils increasing 1.0 grade level each on the regular reading materials while decreasing on their respective MAT grade equivalents (-0.8 and -1.4).

Table 8 also shows the same information with regard to arithmetic, the other "target" subject area of the project. Of the 15 combined arithmetic scores on the MAT, 8 showed at least a 0.5 grade level increase, 7 others changed their grade levels less than 0.5 (+ or -), while none of the pupils showed a decrease of 0.5 grade level or more. Of the 8 pupils showing an increase on the MAT measure, 7 also showed an increase of at least one grade level on the regular arithmetic materials. Again, as was the case in reading, 2 pupils had contradictory movements in their grade level comparisons in arithmetic on the MAT and on the regular school materials, each gaining 2.0 grade equivalents on the regular school materials while decreasing slightly (-0.1 and -0.2) on the MAT grade equivalents.

TABLE 9

AVERAGE AMOUNT OF IMPROVEMENT, IN GRADE LEVELS, FOR THE EXPERIMENTAL CLASS AS MEASURED BY MAT AND REGULAR SCHOOL MATERIAL. (N = 15)

READING			
Regular School Materials		MAT	
Pre	Post	Pre	Post
5.2	5.9	5.1	5.5
ARITHMETIC			
Regular School Materials		MAT	
Pre	Post	Pre	Post
5.0	5.9	5.6	6.1

Table 9 presents the average grade equivalents (pre and post) for both measures, the MAT, and the regular school materials. In reading the class average rose 0.7 of a grade equivalent as measured by regular school materials, while it rose only 0.4 of a grade equivalent as measured by the MAT. The trend for arithmetic was similar, a 0.9 increase on the regular school materials and a 0.5 increase on the MAT.

Table 10 shows in summary form the per cent of disruptive behavior for the 3 target children, as well as their academic status, under standard versus reinforcement conditions. It can be seen that each of the 3 target children improved one full grade level in reading within 60 days under reinforcement procedures. Similarly, their disruptive behavior was drastically reduced both in terms of the researcher's direct behavior observations and in terms of the teacher's ratings.

TABLE 10

THREE TARGET CHILDREN: PER CENT OF DISRUPTIVE BEHAVIOR, TEACHER RATINGS, AND READING GRADE LEVELS FOR TWO DIFFERENT CONDITIONS

	Standard Conditions	Reinforcement Procedures
Per Cent of Disruptive Behavior	50% *	12% *
Teacher's Ratings of Disruption	4.7 *	2.2 *
Reading Grade Levels		
Edward	4th	5th
Lewis	4th	5th
Kenneth	6th	7th
Time Duration of Reading Sample	90 days	60 days

* Based on a 10-day sample.

XI. DISCUSSION

The results of this experiment show that reinforcement for correct academic performance can increase both day to day academic performance, as shown by the number of tests taken and tests passed under the various conditions, and over-all academic achievement as measured by both the Metropolitan Achievement Test and the number of grade levels advanced by the children in the experimental class.

XII. GENERAL DISCUSSION

The results of the three experiments presented in this report demonstrate that:

A. Discipline problems can be virtually eliminated through the application of appropriate behavioral procedures.

B. Reinforcement for academic performance can significantly increase the academic level of a classroom group of children.

It must be bourne in mind that this class had been considered perhaps the most disruptive in the history of Jessie Mae Jones, yet the reinforcement procedures were able quickly and easily to bring it under control. Further, the increases in academic performance were attained in only 60 academic days.

These increases and changes, while impressive, pose more questions than they answer. Given the limitations in back-up reinforcers available within a public school, how can the available reinforcers be utilized more adequately? What would be the effects of a year long program that concentrated on academic performance? The results of these experiments suggest that the more the school is encompassed by behavior management techniques, the more effective the program will be. For example, if the whole school is set up under behavioral principles, the administration can focus all of its efforts on effectively implementing the program rather than having to split attention between "traditional" demands and the demands of the reinforcement program. Furthermore, such a procedure would allow more flexibility in scheduling of teachers and reinforcing activities, so that

the demands both of stated policy and of sound behavior management principles could be more easily met.

For a variety of historical reasons, school systems have found themselves faced with increasing demands. The system which has evolved in response to those demands serves the best interests of no one; the pupils do not learn, the teachers become bookkeepers and disciplinarians, and the administration is forced to assume the position of arbitration. A new look is in order, one which meets the needs for which schools were created.

REFERENCES

Barrish, H.; Saunders, M.; and Wolf, M. M. "Good behavior game: Effects of individual contingencies for group consequences on disruptive behavior in a classroom," Journal of Applied Behavior Analysis, 1969 2, 119-124.

Becker, W. C.; Madsen, C. H.; Arnold, R.; and Thomas, D. R. "Contingent use of teacher attention and praise in reducing classroom behavior problems," Journal of Special Education, 1967, 1, 287-307.

Glavin, J.; Quay, H.; and Werry, J. "Behavioral and academic gains of conduct problem children in different classroom settings," Exceptional Children, 1971, 441-445.

Kleine, P. F. and Pereira, P. "Limits of perception: What teacher trainees see and don't see in the classroom." Reported in Research and Development Reviews, Atlanta Public Schools, February 8, 1971.

O'Leary, K. D.; Becker, W. C.; Evans, M.; and Saudergas, R. A. "A token reinforcement system in a public school classroom: A replication and systematic analysis," Journal of Applied Behavior Analysis, 1969, 2, 3-13.

Osborne, J. "Free time as reinforcer in the management of classroom behavior," Journal of Applied Behavior Analysis, 1969, 2, 113-118.

GSA ATLANTA GA 72-1378